

REMARKS

Claims 1 - 66 are pending in the application and stand rejected, but claims 28 - 30, 62, 63, 65 and 66 are found by the Examiner to be allowable if rewritten to overcome the rejections under 35 USC sec. 112 and to include all of the limitations of the base claim and any intervening claims. In view of the foregoing amendments and the following remarks, applicants request reconsideration of the rejection of the claims and reexamination of the application.

Certified Copy of Priority Document As a preliminary matter, a certified copy of the priority document, specifically, a certified copy of German patent application No. 196 48 798.6, is submitted herewith.

Allowable Claims Amended and Corresponding New Claims Added Applicants appreciate the Examiner's indication that claims 28 - 30, 62, 63, 65 and 66 are allowable if rewritten to overcome the rejections under sec. 112 and to include all of the limitations of the base claim and any intervening claims. Claims 28-30 are so amended, above, and should now be allowed.

Likewise, claim 62 is so amended, above, and should now be allowed. Claim 62 was directly dependent from claims 60 or 61. In turn, each of claims 60 and 61 depends from either claim 54 or 55. As now amended claim 62 is made independent, including all of the limitations of base claim 54 and intervening claim 60. The alternative dependent claim chain of original claim 62, i.e., 54/55/60/62 is now presented as new claim 67. Similarly, the next alternative dependent claim chain of original claim 62, i.e. 54/61/62 is now presented as new claim 68.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

The final alternative dependent claim chain of original claim 62, i.e. 54/55/61/62 is now presented as new claim 69.

Claim 63 depends directly and only from claim 62 and, so, is not amended and should now be allowed.

Claim 65 is amended, above, to overcome the rejections under sec. 112 and to include all of the limitations of base claim 1 and intervening claims 9 and 11, and should now be allowed. Intervening claim 11 is dependent from claim 9 or 10, and the alternative dependent claim chain established by original claim 65, i.e., 1/9/11/65 is now presented in new claim 70.

Claim 66 is likewise amended above to overcome the rejection under sec. 112 and to depend directly and only from claim 65, and should now be allowed.

Additional Claim Amendments Independent claims 1 and 49 are amended above to focus those claims and their dependent claims on preferred embodiments, specifically, to expressly recite in step (a) of the process introducing a hydrogel formed at pH greater than 3 as initial charge. Support is found throughout the application and claims as originally filed. Claim 3 is amended to add the missing word "or" as noted by the Examiner. Claims 3, 22, 34, 36 and 37 each is amended to remove the "preferably" clause, as suggested by the Examiner. Corresponding new claims 71 – 75 are added to recite the embodiments of the "preferably" clauses. A minor editorial amendment is made in claim 54. The preamble in each of claims 3, 5, and 54 – 66 is amended to be more in the style of typical US patent claim. The dependency of claim 66 is corrected to be from claim 65 rather than 12. Other claim amendments are pointed out in the remarks, below.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Abstract As noted above, a replacement Abstract is provided in Attachment A to this paper. Support for the replacement Abstract is found throughout the specification as originally filed, including especially, for example, the original specification.

Fee for Multiple Dependency Applicants note that the fee for multiple dependency was not marked in the original filing papers. If such fee is due, the Commissioner is hereby authorized to charge same and any other required fees to Deposit Account No. 19-0733.

Fee for Increased Number of Claims The requisite fee for the increased number of claims is provided by the Fee Transmittal filed together herewith. If required, the Assistant Commissioner is hereby authorized to charge same and any other required fees to Deposit Account No. 19-0733.

First Paragraph of Specification The paragraph inserted on page 1 of the specification by the Preliminary Amendment is rewritten, above, as requested by the Examiner, to recite the status (i.e., now abandoned) of parent application USSN 09/308,888.

Patentability under § 102(b) over Deshpande et al. Claims 1, 2, 4, 8-12, 17, 18, 25, 26, 31-33, 38, 47-50, 52, 54 and 55 are rejected under § 102 (b) over Deshpande et al (WO 94/25149), especially Example 3. The rejection is respectfully traversed.

Deshpande et al does not disclose the subject matter defined by any of claims 1, 2, 4, 8-12, 17, 18, 25, 26, 31-33, 38, 47-50, 52, 54 and 55, because it does not disclose each and every element of any of those claims. With respect to claim 1 and its dependent claims 2, 4, 8-12, 17, 18, 25, 26, 31-33, 38, 47 and 48, Deshpande et al does not disclose a process for preparing an organically modified aerogel, which comprises a) introducing a hydrogel formed at pH greater

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

than 3 as initial charge, b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and c) drying the surface-modified gel obtained in step b). Considering especially Example 3 of Deshpande et al, it is expressly taught (penultimate paragraph on page 13) that the gel is washed with acetone and then subsequently (last paragraph on page 13 and following paragraph on page 14) the resulting organogel is surface modified with TCMS. Thus, Deshpande et al surface modifies an organogel, not a hydrogel.

With respect to independent claim 49 and its dependent claim 50, Deshpande et al does not disclose a process for the production of organically modified lyogel, which comprises a) introducing a hydrogel formed at pH greater than 3 as initial charge, and b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a surface modified gel. As noted above, Deshpande et al surface modifies an organogel, not a hydrogel.

Further with respect to claims 38 and its dependent claims 47 and 48, and claim 50 and its dependent claim 52, the Examiner has identified no specific aerogels or lyogels of Deshpande et al that are free of Si-OR groups. Nevertheless, to expedite prosecution of the application, claim 38 is amended above to define aerogels produced by the process of claim 1. Likewise, claim 50 is amended above to define lyogels produced by the process of claim 49.

With respect to independent claim 54 and its dependent claim 55, Deshpande et al does not disclose a process for producing an organically modified lyogel, which comprises a) forming a hydrogel at pH > 3 [or, for claim 55, pH between pH 3 and pH 8]; b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and c) optionally after additional treatment steps, drying the surface modified gel obtained in step b). As noted above, Deshpande et al surface modifies an organogel, not a hydrogel.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

In addition, rejected dependent claims recite elements or limitations establishing their further patentability over the citation. Accordingly, the rejection over Deshpande et al should be withdrawn.

Patentability under § 103(a) over Deshpande et al. Claims 39, 40, 51, 60 and 61 are rejected under § 103(a) over Deshpande et al. The rejection is respectfully traversed.

With respect to independent claim 39 and its dependent claim 40, and with respect to independent claim 51, the Examiner has identified in Deshpande et al no specific teaching or suggestion of an aerogel or lyogel, respectively, whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification. Nor has the Examiner identified any basis for a conclusion that one skilled in the art would be motivated to modify the Deshpande et al materials to arrive at an aerogel or lyogel, respectively, whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification.

With respect to claims 60 and 61, the Examiner has provided no reason or basis to support the assertion that a process for preparing an organically modified aerogel, wherein a hydrogel is formed at pH greater than 3, the hydrogel, optionally after intermediate treatment steps, is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel, and the surface modified gel, optionally after additional treatment steps, is dried, and wherein the process is carried out as a continuous or semi-continuous process, would have been obvious from Deshpande et al to one skilled in the art.

In addition, rejected dependent claims recite elements or limitations establishing their further patentability over the citation. Accordingly, the rejection over Deshpande et al should be withdrawn.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Q Patentability under § 102(e) over Jansen et al. Claims 1-3, 8-12, 22, 25, 26, 31, 33, 38, 47-50, 52, 54-55, and 64 are rejected under § 102(e) over Jansen et al (US 5,647,962), especially the Abstract and Example. The Examiner acknowledges, that the present application and Jansen et al are assigned to the same assignee. The rejection is respectfully traversed.

Jansen et al does not disclose the subject matter defined by any of the rejected claims, because it does not disclose each and every element of any of those claims. Like Deshpande et al discussed above, Jansen et al surface modifies an organogel, not a hydrogel. In addition, the dependent claims recite features establishing their further patentability over the citation.

With respect to claim 1 and its dependent claims 2-3, 8-12, 22, 25, 26, 31, 33, 38, 47 and 48, Jansen et al does not disclose a process for preparing an organically modified aerogel, which comprises a) introducing a hydrogel formed at pH greater than 3 as initial charge, b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and c) drying the surface-modified gel obtained in step b). The example of Jansen et al expressly performs solvent exchange before surface modification, that is, a hydrogel is first washed with toluene and then the resulting organogel is surface modified with TCMS. (See especially col. 3, lines 9-12 of Jansen et al: "The toluene-containing gel was then silylated ...") Thus, Jansen et al surface modifies an organogel, not a hydrogel. Also, in column 2, lines 21-28, Jansen et al describes step (c) of its process, in which "the water contained in the gel is removed ..." Later, in col. 2 at lines 34-47, Jansen et al describes the subsequent step (d) of its process, in which "the solvent-containing gel is reacted with a silylating agent."

With respect to claims 38 and its dependent claims 47 and 48, and claim 50 and its dependent claim 52, the Examiner has identified no specific aerogels or lyogels of Deshpande et al that are free of Si-OR groups. Nevertheless, to expedite prosecution of the application, as

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

noted above, claim 38 is amended above to define aerogels prepared by the process of claim 1 and claim 50 is amended above to define lyogels produced by the process of claim 49.

With respect to independent claim 49 and its dependent claims 50 and 52, Jansen et al does not disclose a process for producing an organically modified lyogel, which comprises a) introducing a hydrogel formed at pH greater than 3 as initial charge and b) subjecting the hydrogel obtained in step (a) to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel. As noted above, Jansen et al surface modifies an organogel, not a hydrogel.

With respect to independent claim 54 and its dependent claims 55 and 64, Jansen et al does not disclose a process for producing an organically modified lyogel, which comprises a) forming a hydrogel at pH > 3; b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and c) optionally after additional treatment steps, drying the surface modified gel obtained in step b). As noted above, Jansen et al surface modifies an organogel, not a hydrogel.

In addition, rejected dependent claims recite elements or limitations further establishing their patentability over the citation. Accordingly, the rejection over Jansen et al should be withdrawn.

Patentability under § 103(a) over Jansen et al. Claims 6, 7, 13, 35-37, 39-43, 45, 46, 51, 60 and 61 are rejected under § 103(a) over Jansen et al. The Examiner acknowledges, that the present application and Jansen et al are assigned to the same assignee. The rejection is respectfully traversed.

With respect to claims 6, 7 13, 35-37, as noted above, Jansen et al does not teach or suggest a process for preparing an organically modified aerogel, which comprises a)

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

introducing a hydrogel formed at pH greater than 3 as initial charge, b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and c) drying the surface-modified gel obtained in step b). In addition, the dependent claim limitations further establish patentability over Jansen et al.

With respect to claims 39-43, 45, 46 and 51, Jansen et al does not teach or suggest an aerogel or a lyogel whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification.

With respect to claims 60 and 61, Jansen et al does not teach or suggest the claimed process wherein the process is carried out as a continuous or semi-continuous process. Accordingly, the rejection over Jansen et al should be withdrawn.

Patentability over Jansen et al in view of Geiss et al. Claim 44 is rejected under §103(a) over Jansen et al in view of Geiss et al (WO 96/12683). The Examiner acknowledges that Jansen et al fails to disclose adding fibers to its hydrophobic SiO₂ aerogel composition and cites Geiss et al at page 5, line 14 to page 10, line 1. The rejection is respectfully traversed.

Geiss et al fails to cure the deficiencies of Jansen et al. Nothing in Geiss et al teaches or suggests forming a hydrogel at pH greater than 3 and, optionally after intermediate treatment steps, subjecting the hydrogel to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel. In that regard, it is notable that each of the examples of Geiss et al recites hydrophobic aerogel as a starting material, thus providing no incentive or motivation to one skilled in the art to modify Jansen et al's teaching of solvent exchange prior to hydrophobing. Accordingly, the rejection should be withdrawn.

Patentability over Jansen et al in view of McDaniel et al. Claims 4 and 56-59 are rejected under §103(a) over Jansen et al in view of McDaniel et al (US 4,316,807). The

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Examiner acknowledges that Jansen et al fails to disclose the details of an embodiment using acid in lieu of an acid ion exchanger and cites Example VII of McDaniel et al. The rejection is respectfully traversed.

McDaniel et al fails to cure the deficiencies of Jansen et al. In particular, as noted above, Jansen et al surface modifies an organogel, not a hydrogel. The cited Example VII of McDaniel et al does not cure this deficiency; it does not teach or suggest forming a hydrogel at pH greater than 3 and, optionally after intermediate treatment steps, subjecting the hydrogel to surface modification by mixing the hydrogel with hydrophobing agent. Rather, it adds silylating agent right along with waterglass and acid. More specifically, in the cited Example VII of McDaniel et al, a mixture of aqueous sodium silicate solution and aqueous sulfuric acid solution is formed and TMCS is added only 4 minutes after acidification. Example I of McDaniel et al, which is incorporated into Example VII, states that gelation is only initiating in the acidified silicate solution after 30 minutes.¹ Thus, the cited example does not teach or suggest the process of present claim 4 and, rather, teaches away from the process of claim 4.

Moreover, the silane modified silica gel of McDaniel et al's Example VII is not a "surface modified gel" as that term is used in the present claims. Far too little silane is employed by McDaniel et al to achieve hydrophobicity. In fact, the resultant gels of McDaniel et al are expressly designed for use as a "hydrous inorganic material" (Abstract) in water-based drilling fluids. McDaniel et al's SiO₂ concentration in Example VII is an order of magnitude greater than its silane concentration ("resultant SiO₂ concentration = 1.63 percent; TMCS = 0.1 percent"). The other McDaniel et al examples are similar. In contrast, Example 1 of the present application uses twice as much silylating agent as gel (200 g of hexamethyldisiloxane

1. Comparative Example II of McDaniel et al uses the same process except that the hydrogel was allowed to form for "several hours" prior to addition of silane. It is noteworthy both that gelation for the process is clearly shown, therefore, to require hours, and that delayed addition of silylating agent is dismissed for resulting in "poor pseudoplastic properties." (Col. 9, line 3.)

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

vs. 100 g of hydrogel). The other examples of the present application are similar: Example 2 uses an entire liter of HMDSO for 150 g of hydrogel; Example 3 uses 250 g HMDSO for 100 g of hydrogel; etc. The rejected independent claims, i.e., claim 1, 54 and 58, each is amended above to recite in step (b) the hydrophobic surface modified gel. Thus, claim 1, from which claim 4 depends, recites: "b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel." Corresponding language appears in claim 54, from which claims 56 and 57 depend, and in claim 58, from which claim 59 depends.

Accordingly, the rejection should be withdrawn.

Patentability under §102(e) over Schwertfeger et al. Claims 1-3, 8-11, 31, 33, 34 and 48-58 are rejected under § 102(e) over Schwertfeger et al (US 5,888,425). The Examiner acknowledges, that the present application and Jansen et al are assigned to the same assignee. The rejection is respectfully traversed.

Schwertfeger et al does not disclose the subject matter defined by any of the rejected claims, because it does not teach each and every element of any of those claims. Like Deshpande et al and Jansen et al discussed above, Schwertfeger et al surface modifies an organogel, not a hydrogel. In addition, the rejected dependent claims recite features further establishing their patentability over the citation.

Schwertfeger et al forms a lyogel in organic solvent or forms a hydrogel and then performs solvent exchange prior to silylation. The clause in Schwertfeger et al that a solvent exchange can be performed, if desired, with another organic solvent in step (b) (in the abstract, summary, etc) relates to these two alternative routes to a silylated gel in step (a). More specifically, at Col. 3, lines 1-10, Schwertfeger et al relates the first alternative, forming the gel in an organic solvent with water. The example is given of ethanol with 20 % by volume of

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

water. This is not a hydrogel as that term is understood by those skilled in the art and defined in the present specification.² Following the organogel alternative, Schwertfeger et al describes a hydrogel alternative at Col. 3, lines 11-30.

Schwertfeger et al then states:

“The lyogel obtained in (i) or (ii) [i.e., by organogel or hydrogel route, respectively] is washed with an organic solvent until the water content of the gel is less than 5% by weight, preferably less than 2% by weight, and particularly preferably less than 1% by weight.” (Col. 3, lines 31-34.)

If the organogel route were used and the water content of the solvent were already less than 5% or the like, there would be no call to perform solvent exchange. Hence the “if desired” clause in step (b) in the Schwertfeger et al summary. Only after the solvent exchange of step (b) does Schwertfeger et al go on to describe silylating the gels. Thus, there is no teaching or suggestion in Schwertfeger et al to surface modify a hydrogel. Rather, Schwertfeger et al surface modifies only organogels.

Accordingly, the rejection is without merit and should be withdrawn.

Patentability under §103(a) over Schwertfeger et al. Claims 35, 37, 39, 40, 44, 46, 51, 60 and 61 are rejected under § 103(a) over Schwertfeger et al (US 5,888,425). The Examiner acknowledges, that the present application and Jansen et al are assigned to the same assignee. The rejection is respectfully traversed.

Schwertfeger et al is not prior art to the present application under §103(a) in view of their common ownership at the time the inventions were made, as shown by the common

² “By a hydrogel in the present application is meant a gel which is in dispersion in at least one solvent, the liquid phase containing at least 50% by weight, preferably 80 % by weight, with particular preference at least 90 % by weight and in particular, at least 98 % by weight water.”

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

applicant identified in the cover page of their corresponding published PCT applications (copies attached).

Even if Schwertfeger et al were available under §103(a), the subject claims are patentable over Schwertfeger et al. The remarks presented immediately above are equally relevant here and are incorporated here by reference. Schwertfeger et al does not teach or suggest the subject matter defined by any of the rejected claims, because it does not teach each and every element of any of those claims. Like Deshpande et al and Jansen et al discussed above, Schwertfeger et al surface modifies an organogel, not a hydrogel. In addition, the rejected dependent claims recite features further establishing their patentability over the citation.

With respect to claims 60 and 61, the Examiner has provided no reason or basis to support the assertion that a process for producing an organically modified lyogel, which comprises a) forming a hydrogel at pH > 3; b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and c) optionally after additional treatment steps, drying the surface modified gel obtained in step b), wherein the process is carried out as a continuous or semi-continuous process, would have been obvious from Schwertfeger et al.

With respect to claims 39, 40, 46 and 51, the Examiner has identified in Schwertfeger et al no specific teaching or suggestion of an aerogel or lyogel, respectively, whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification. Nor has the Examiner identified any basis for a conclusion that one skilled in the art would be motivated to modify the Deshpande et al materials to arrive at an aerogel or lyogel, respectively, whose internal surface is covered by at least 90% of the theoretically possible value with organic surface groups which have been applied by surface modification.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

With respect to claims 35, 37 and 44, each is a dependent claim and the remarks above regarding their respective independent claims are incorporated here by reference. Accordingly, the rejections are seen to be without merit and should be withdrawn.

Patentability over Schwertfeger et al under the Judicially Created Doctrine of Obviousness-Type Double Patenting Claims 1-3, 8-11, 31, 33, 34, 48, 49, 50-56 and 58 are rejected over Schwertfeger et al (US 5,888,425) under the judicially created doctrine of obviousness-type double patenting. The rejection is respectfully traversed for the reasons set forth in the preceding section, which are incorporated here by reference. In addition, the rejected dependent claims recite features further establishing their patentability over the citation. Accordingly, the rejection is without merit and should be withdrawn.

Patentability over Burns et al Claims 1, 2, 4, 6, 8-11, 13-23, 25, 26, 31, 33, 35-38, 41, 42, 45, 47, 49, 50 and 52 are rejected under §102(e) over Burns et al (6,107,351). The Examiner cites especially Example 1 and Table 1. The rejection is respectfully traversed.

Burns et al does not disclose the subject matter defined by any of claims 1, 2, 4, 6, 8-11, 13-23, 25, 26, 31, 33, 35-38, 41, 42, 45, 47, 49, 50 and 52, because it does not teach each and every element of any of those claims. With respect to claim 1 and its dependent claims, Burns et al does not teach a process for preparing an organically modified aerogel, wherein a hydrogel is formed at pH greater than 3, the hydrogel is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and the surface modified gel is dried.

The Burns et al patent expressly calls for forming a gel "at a pH less than about 1." (See the Burns et al Abstract, and the Summary at col. 3, lines 3-4, and the Detailed

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Description, e.g., at Col. 3, lines 29-37, col. 4, lines 48-51, etc.). In contrast, present claim 1 recites:

“a) a hydrogel is formed at pH greater than 3;”

Independent claim 49 contains corresponding language. Thus, a clear contrary teaching is found in Burns et al. In addition, further patentable distinctions are found in the various dependent claims included in the rejection.

Accordingly, the rejection over Burns et al should be withdrawn.

here

Patentability over Copending Application Serial No. 09/578,665 under the Judicially Created Doctrine of Obviousness-Type Double Patenting Claim 5 is rejected over copending application Serial No. 09/578,665 (now US patent 6,475,561) under the judicially created doctrine of obviousness-type double patenting. The rejection is respectfully traversed. Nevertheless, to expedite allowance of the application, applicants will submit a terminal disclaimer over Serial No. 09/578,665 upon an indication of allowance of pending claims.

Accordingly, the rejection should be withdrawn upon submittal of the terminal disclaimer.

Patentability over Sudo et al. Claims 1, 24, 27 and 50-53 are rejected under §102(b) or in the alternative under § 103(a) over Sudo et al (US 5,134,110). The Examiner cites especially Example 1-38 of Sudo et al and col. 2, line 16 to col. 6, line 18. The rejection is respectfully traversed.

6

Sudo et al does not disclose the subject matter defined by any of the rejected claims, because it does not teach each and every element of any of those claims. In fact, Sudo et al does not teach or suggest any method for preparing a hydrogel. Rather, the disclosure and

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

examples of Sudo et al start with a silica gel (or a porous glass). Thus, Sudo et al can not be said to teach a process for preparing an organically modified aerogel, wherein a hydrogel is formed at pH greater than 3, the hydrogel is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel, and the surface modified gel is dried.

Accordingly, the rejection is without merit and should be withdrawn.

The Claims Meet the Requirements of §112, first paragraph Claims 1, 8-33, 35-46, 48-55 and 60-66 are rejected under §112, first paragraph. The Examiner asserts that the claims are enabled for inorganic gels but not for organic gels. The rejection is respectfully traversed.

The invention is fully enabled by the specification. Innumerable embodiments are disclosed and discussed in the specification, and innumerable others will be readily apparent to those skilled in the art given the benefit of the present invention. This is an art area where there is considerable background teaching available to those skilled in the art. Moreover, it is well established that there is no need to present examples of every embodiment of a claimed invention.

The Examiner has not supported the rejection with objective evidence of non-enablement. Accordingly, applicant respectfully submits that the rejection is in error and should be withdrawn.

The Requirements of §112, second paragraph are Met Claims 3, 22, 34, 36-38, 48, 50 and 53 are rejected under §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The rejection is respectfully traversed.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Each of the subject claims is seen to fully meet the requirements of §112, first paragraph in particularly pointing out and distinctly claiming the subject matter which applicants regard as the invention. With respect to claims 22, 34, 36 and 37, as indicated above, the "preferably" clauses are deleted and presented in corresponding dependent claims.

With respect to claims 48 and 53, applicant submits that the express recital of use "as a thermal insulation material" in claim 48 sets forth an active, positive step delimiting how the claimed use would be practiced, and would be readily understood by those skilled in the art. Likewise, the express recital of use "in chromatography, in cosmetology and in the pharmaceuticals sector" in claim 53 sets forth active, positive step delimiting how the claimed use would be practiced, and would be readily understood by those skilled in the art.

With respect to claim 3, Applicants appreciate the Examiner pointing out the editorial error in line 10. The word "or" is added, as suggested by the Examiner. In addition, the "if desired" clause regarding optional washing of the gel is deleted, since the claim, as amended, covers the claimed process both with and without the optional washing with water.

W- With respect to claim 38, 50 and 53, the variable "R" is defined by its use in industry and science as a generic term for an organic moiety. Moreover, the meaning of R will be readily understood from the specification and claims as originally filed.

Accordingly, applicant requests that the rejection be withdrawn.

Review of Specification

Applicants appreciate the Examiners suggestion for cooperation in correcting any errors that applicant may become aware of in the specification.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Remaining References

Applicants acknowledge the Examiner's statement in paragraph 25 of the Office Action, that the remaining citations listed on the Form PTO-1449 and two Forms PTO-892 are cumulative and/or further show the state of the art. None is seen by applicants to render the claimed subject matter unpatentable.

Extension of Time

A petition and the requisite fee for a three month extension of time to file this response to the Office Action is included in the transmittal papers filed herewith.

CONCLUSION

In view of the amendments and remarks above, applicant submits that all claims pending in the application are in condition for allowance and requests that this application be passed to issue.

Respectfully submitted,



Peter D. McDermott
Attorney for Applicants
Reg. No. 29,411

Banner & Witcoff, Ltd.
28 State Street, 28th Floor
Boston, MA 02109
Telephone: (617) 227-7111
Facsimile: (617) 227-4399

CERTIFICATE OF EXPRESS MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as express mail No. EV159077444US in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on:

Rachelle Chery 1/24/03
Rachelle Chery Date

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(003259.00015)

Applicants: Schwertfeger et al. Paper No. 5
U.S. Serial No.: 09/817,459 Group Art Unit: 1712
Filed: March 26, 2001 Examiner: Lovering, R.D.
Title: Organically Modified Aerogels, Method for Their Production by
 Surface Modification of the Aqueous Gel Without Previous Solvent
 Exchange and Subsequent Drying and the Use Thereof

.....

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 1, 3, 5, 22, 28-30, 34, 36-38, 49, 50, 54-66 are amended as follows:

Claim 1. (Amended) A process for preparing an organically modified aerogel, which comprises

- a) introducing a hydrogel formed at pH greater than 3 as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel, and
- c) drying the surface-modified gel obtained in step b).

Claim 3. (Twice Amended) A process for preparing an organically modified aerogel, which comprises: ~~Method for the production of organically modified aerogels, characterized in that:~~

- a) forming a silicatic hydrogel ~~is formed~~ at $\text{pH} \geq 3$;

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

b) subjecting the silicatic hydrogel formed in step a), optionally after intermediate treatment steps, ~~is subjected~~ to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and

c) drying the surface modified gel obtained in step b), optionally after additional treatment steps, ~~is dried~~,

wherein the silicatic hydrogel is prepared by bringing an aqueous waterglass solution to a $\text{pH} \leq 3$ with the aid of an acidic ion exchanger resin; or a mineral acid, and polycondensing the resulting silicic acid by addition of a base to form an SiO_2 gel, ~~and, if desired, washing the gel with water to free it from any electrolyte.~~

Claim 5. (Twice Amended) A process for preparing an organically modified aerogel, which comprises: Method for the production of organically modified aerogels, characterized in that:

a) forming a silicatic hydrogel ~~is formed~~ at $\text{pH} \geq 3$;

b) subjecting the silicatic hydrogel formed in step a), optionally after intermediate treatment steps, ~~is subjected~~ to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and

c) drying the surface modified gel obtained in step b), optionally after additional treatment steps, ~~is dried~~,

wherein the silicatic hydrogel is obtained by hydrolysis and polycondensation of silicon tetrachloride.;

Claim 22. (Twice Amended) The process as claimed in claim 1, wherein the agent for surface modification is generated shortly before and/or during the surface modification, ~~preferably by means of an acid.~~

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Claim 28. (Amended) ~~The A process as claimed in claim 27, for preparing an organically modified aerogel, which comprises:~~

- a) introducing a hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein ~~the~~ an outer surface of the hydrogel is dried by means of at least one gas prior to surface modification.

Claim 29. (Amended) ~~The A process as claimed in claim 27 or 28, for preparing an organically modified aerogel, which comprises:~~

- a) introducing a hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

wherein ~~the~~ an outer surface of the hydrogel is dried by means of HCl gas prior to surface modification.

Claim 30. (Amended) ~~The A process as claimed in claim 27, for preparing an organically modified aerogel, which comprises:~~

- a) introducing a hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a) to form a surface modified gel, and
- c) drying the surface-modified gel obtained in step b),

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

wherein ~~the~~ an outer surface of the hydrogel is dried by means of HMDSO prior to surface modification.

Claim 34. (Twice Amended) The process as claimed in claim 2, wherein the gel obtained in step a) is reacted, prior to silylation, with a solution of a condensable orthosilicate of the formula $R^1_{4-n}Si(OR^2)_n$, ~~preferably an alkyl and/or aryl orthosilicate~~, where $n = 2$ to 4 and R^1 and R^2 independently of one another are hydrogen atoms or linear or branched C_1 - C_6 -alkyl, cyclohexyl or phenyl radicals, or with an aqueous silicic acid solution.

Claim 36. (Amended) The process as claimed in claim 35, wherein the additives comprise ~~used are~~ ionic compounds, ~~preferably NaCl~~.

Claim 37. (Amended) The process as claimed in claim 35 or 36, wherein the additives comprise ~~used are~~ opacifiers, ~~preferably IR opacifiers~~.

Claim 38. (Amended) An aerogel produced by the process of claim 1, which is free from Si-OR groups.

Claim 49. (Amended) A process for producing an organically modified lyogel, which comprises

- a) introducing a hydrogel formed at pH greater than 3 as initial charge, and
- b) subjecting the hydrogel obtained in step (a) to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Claim 50. (Amended) An aerogel produced by the process of claim 49, which is free from Si-OR groups.

Claim 54. (Amended) A process for producing an organically modified lyogel, which comprises: Method for the production of organically modified aerogels, characterized in that

- a) forming a hydrogel is formed at pH > 3;
- b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, ~~is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a hydrophobic surface modified gel; and~~
- c) ~~the surface modified gel obtained in step b),~~ optionally after additional treatment steps, drying the surface modified gel obtained in step b) ~~is dried.~~

Claim 55. (Amended) The process method for the production of organically modified aerogel according to claim 54, ~~characterized in that~~ wherein the hydrogel is formed in step a) at pH between pH 3 and pH 8.

Claim 56 (Amended) The process method for the production of organically modified aerogel according to claim 54 or 55, ~~characterized in that~~ wherein the hydrogel is formed in step a) by lowering the pH of an aqueous waterglass solution.

Claim 57. (Amended) The process method for the production of organically modified aerogel according to claim 55, ~~characterized in that~~ wherein the pH of an aqueous waterglass solution is lowered in step a) to a pH value not less than 3.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Claim 58. (Amended) A process for producing an organically modified lyogel wherein
~~Method for the production of organically modified aerogel characterized in that~~ a) a hydrogel is
formed by lowering the pH of an aqueous waterglass solution by addition of acid to $\text{pH} \geq 8$
and establishing the pH between pH 3 and pH 8; b) the hydrogel formed in step a) optionally
after intermediate treatment steps, is subjected to surface modification by mixing the hydrogel
with hydrophobing agent to form a hydrophobic surface modified gel; and c) the surface
modified gel obtained in step b), optionally after additional treatment steps, is dried.

Claim 59. (Amended) The process ~~method for the production of organically modified aerogel~~
according to claim 54 or 55, ~~characterized in that~~ wherein the hydrogel is formed in step a) by
addition of acid to aqueous waterglass solution and without subsequent addition of base in step
a).

Claim 60. (Amended) The process ~~method for the production of organically modified aerogel~~
according to claim 54 or 55, ~~characterized in that~~ wherein step a) and b) are carried out as a
semi-continuous process.

Claim 61. (Amended) The process ~~method for the production of organically modified~~
~~aerogel~~ according to claim 54 or 55, ~~characterized in that~~ wherein steps a) and b) are carried out
as a continuous process.

Claim 62. (Amended) ~~The~~ A process for producing an ~~method for the production of~~
organically modified aerogel, which comprises: according to claim 60 or 61, characterized in
that

- a) forming a hydrogel at $\text{pH} > 3$;

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

b) surface modifying the hydrogel formed in step a), optionally after intermediate treatment steps, by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and

c) optionally after additional treatment steps, drying the surface modified gel obtained in step b);

~~characterized in that~~ wherein steps a) and b) are carried out as a semi-continuous process, wherein a continuous or semi-continuous stream of acid is mixed with a continuous or semi-continuous stream of aqueous waterglass solution.

Claim 63. (Amended) ~~The process method for the production of organically modified aerogel~~ according to claim 62, ~~characterized in that~~ wherein the acid stream is admixed with the aqueous waterglass solution through a mixing nozzle.

Claim 64. (Amended) ~~The process method for the production of organically modified aerogel~~ according to claim 54, wherein step b) results in a hydrophobic gel in a liquid phase substantially immiscible with water, which liquid is separated from an aqueous phase formed by the water from the hydrogel.

Claim 65. (Amended) ~~The method~~ A process for the production of preparing an organically modified aerogel, which according to claim 11, ~~characterized in that~~ the hydrophobing agent comprises:

- a) introducing a hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step (a), and
- c) drying the surface-modified gel obtained in step (b),

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

wherein the hydrogel obtained in step b) is subjected to surface silylation using a silylating agent comprising at least one silane of the formula $R^1_{4-n}SiCl_n$ or $R^1_{4-n}Si(OR^2)_n$ where $n = 1$ to 4 and where R^1 and R^2 independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical, wherein the silylating agent comprises at least TMCS and the liquid phase comprises at least HMDSO.

Claim 66. (Amended) ~~The method for the production of organically modified aerogel process according to claim 12~~ 65 wherein characterized in that at least a portion of the HMDSO is subsequently recycled.

NEW CLAIMS 67-75 ARE ADDED

Claim 67. (NEW) The process for producing an organically modified aerogel according to claim 62, wherein the hydrogel is formed in step a) at pH between pH 3 and pH 8.

Claim 68. (NEW) A process for producing an organically modified aerogel, comprising:

- a) a hydrogel is formed at $pH \geq 3$;
- b) the hydrogel formed in step a), optionally after intermediate treatment steps, is subjected to surface modification by mixing the hydrogel with hydrophobing agent to form a surface modified gel; and
- c) the surface modified gel obtained in step b), optionally after additional treatment steps, is dried;

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

wherein step a) and b) are carried out as a continuous process wherein a continuous or semi-continuous stream of acid is mixed with a continuous or semi-continuous stream of aqueous waterglass solution.

Claim 69. (NEW) The process according to claim 68, wherein the hydrogel is formed in step a) at pH between pH 3 and pH 8.

Claim 70. (NEW) The process according to claim 65, wherein the silylating agent is used in liquid form or as a gas or vapor.

Claim 71. (NEW) The process of claim 3 further comprising washing the gel with water to free it from any electrolyte.

Claim 72. (NEW) The process of claim 22, wherein the agent for surface modification is generated shortly before or during the surface modification by means of an acid.

Claim 73. (NEW) The process of claim 34, wherein the gel obtained in step a) is reacted, prior to silylation, with a solution of an alkyl or aryl orthosilicate.

Claim 74. (NEW) The process of claim 36, wherein the additives used comprise NaCL.

Claim 75. (NEW) The process of claim 37, wherein the additives used as opacifiers comprise IR opacifiers.

USSN 09/817,459

AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT

Attachment A

Abstract of the Disclosure

Organically modified gels are disclosed, along with processes for their preparation by surface modification of aqueous gel without prior solvent exchange, and subsequent drying, and their use. The invention relates to novel organically modified aerogels, to processes for producing them and to their use, in which processes (a) a hydrogel is introduced as initial charge, (b) the hydrogel obtained in step (a) is subjected to surface modification, and (c) the surface-modified gel obtained in step (b) is dried. The invention additionally relates to novel, organically modified wet gels, to processes for producing them, and to their use.

USSN 09/817,459

*AMENDMENT IN RESPONSE TO OFFICE ACTION
AND
SUBMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT*